MPM2D
Examination
January 25 AM, 2017

(Exam set for 2 hrs. + 1 hour flex time)

Name:_____

Teacher:_____

School: Brookfield High School

Instructions to students:

1. This examination booklet is 14 pages long. Please check that you have all the pages.

2. Answer all questions with complete solutions in the space provided on the examination paper.

3. You may use a school approved calculator on this examination. Make sure that the calculator is in **DEGREE** mode. **DO NOT SHARE YOUR CALCULATOR.**

4. There is a formula sheet that goes with the examination.

Part A: Analytic Geometry

A1) The cost of getting internet service from SkyHigh Best Buy is a flat monthly fee of $10, plus $0.75 per hour spent on-line.

a. Determine the algebraic expression for the monthly cost of getting internet service. *Don't forget to define your variables.*

b. Create another company that provides 3 different internet service plans. Makeup three new equations so that the linear system formed by the two companies will have:

I) one solution

II) two solutions

III) no solutions.

A2) Solve the following system by Graphing.

$y + 3x = 2$

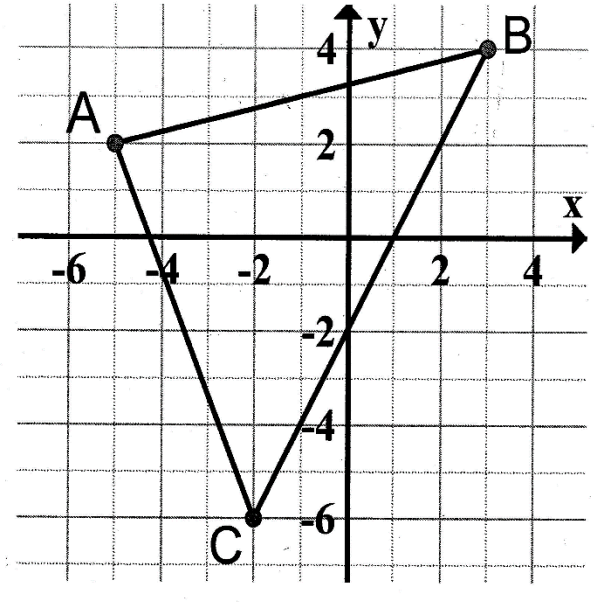
$y - \frac{1}{2}x = -5$

A3) Solve the **same** system $y + 3x = 2$ and $y - \frac{1}{2}x = -5$ using substitution or elimination.

A4) The vertices of a triangle are A(-5,2), B(3,4), and C(-2,-6).

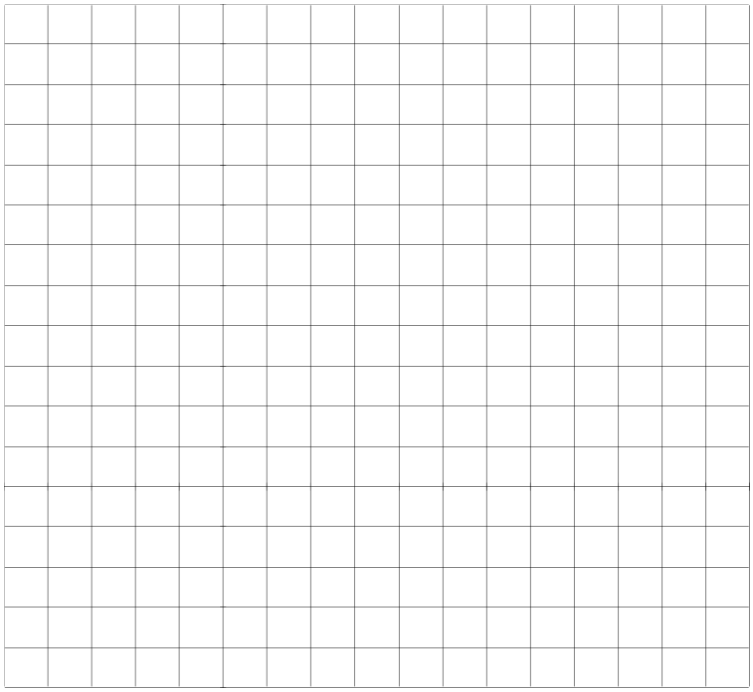
a) Verify that ΔABC is a scalene triangle.

b) What coordinate does vertex C have to be so that ΔABC is isosceles? Show all your work in the space below.



Part B: Quadratics

B1) Graph the parabola whose equation is $y = 0.5(x + 1)^2 - 3$.



B2) Use your graph above to answer the following questions.

a) What are the coordinates of the vertex? _____

b) What is the equation of the axis of symmetry? _____

c) What is the step pattern? _____

d) What is the optimal value? _____

e) State the y-intercept? _____

f) Describe the transformations needed to change the graph of the parent curve $y = x^2$ into $y = 0.5(x + 1)^2 - 3$.

g) Change $y = 0.5(x + 1)^2 - 3$ into standard form.

B3) Express $y = 5x^2 + 18x + 9$ in

factored form

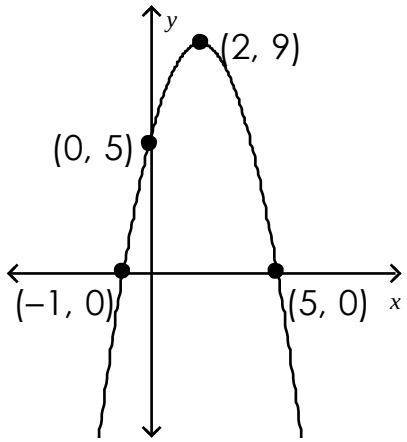
vertex form

B4) A projectile is launched upwards and its height, h, in metres after t seconds is given by the equation $h = -5(t - 120)^2 + 72000$.

a) Find the height of the projectile after 80 seconds?

b) When is the projectile 11500 m above the ground?

B5) E**xplain** why **<u>none</u>** of the following equations could be the equation of the graph shown below. Include at **<u>least</u>** 2 point for each equation. Show all your work.

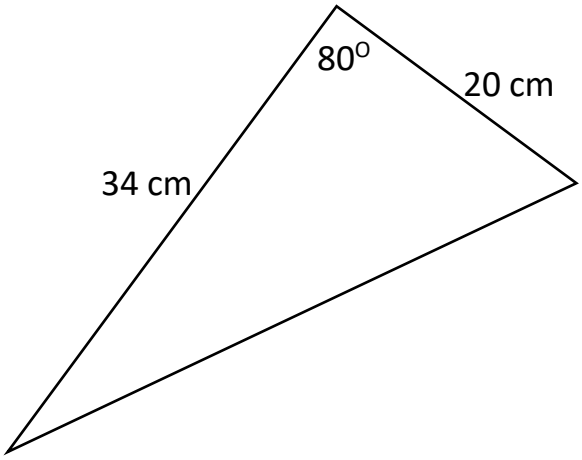


a) $y = (x+1)(x-5)$	b) $y = -x^2 - 4x + 5$	c) $y = -x^2 + 5$

d) What is the right equation?

Part C: Trigonometry

C1) Solve the triangle below. Try using different tool for each calculation. For example, use the sine law and the cosine law, rather than using the sine law twice.



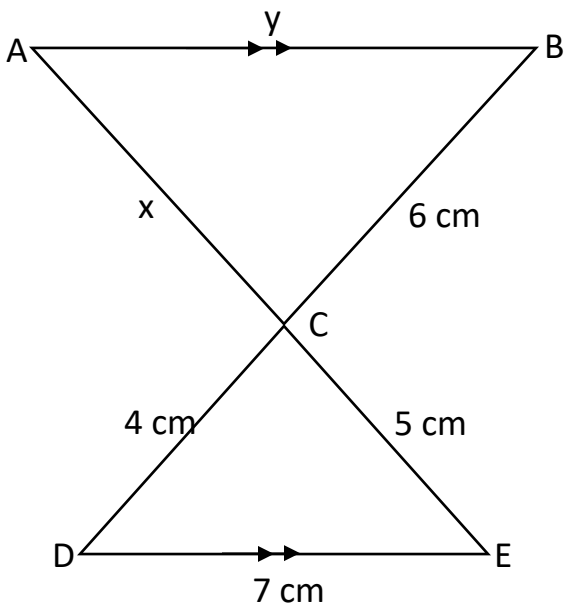
C2) A lighthouse observation deck is about 20 m above sea level. A boat is viewed at an angle of depression of 6^{O}.

a) How far is the boat from the base of the lighthouse?

b) What is the angle of elevation from the boat to the observation deck?

C3) a) Show why ΔABC is similar to ΔEDC.

b) Find the lengths x and y



Formula Sheet: MPM 2D

To the student: Please remove this formula sheet for use during the examination

$$\sin\theta = \frac{opp}{hyp} \qquad \cos\theta = \frac{adj}{hyp} \qquad \tan\theta = \frac{opp}{adj}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \qquad a^2 = b^2 + c^2 - 2bc\cos A$$

$$y = mx + b \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$y = a(x - s)(x - t) \qquad y = ax^2 + bx + c \qquad y = a(x - h)^2 + k$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x^2 + y^2 = r^2$$